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REMARKS/ARGUMENTS

Claims 1-52 were originally filed in the application. Claims 31-39 are canceled for being drawn to a non-elected invention, and Applicant reserves the right to prosecute the canceled claims in a divisional application in future.

Note that Claim 1 is canceled herewith.

Patentability of Claims 2-26

In the Office Action dated March 29, 2007, Claim 12 was rejected only under 35 U.S.C. §101 for being drawn to non-statutory subject matter. See paragraph 4 at the bottom of page 2 of the Office Action. The Examiner's explanation of the § 101 rejection is reproduced below for convenience:

Claims 1-30, 40-43 are directed to a computer implemented method for perform calculations. Claim 52 is merely directed to a computer for implementing the method. In order for such a computer related invention to be statutory, the claimed invention must accomplish a practical application. That is the claimed invention must transform an article or physical object to a different state or thing, or produce a useful concrete, and tangible result. State Street, 149 F.3d at 1373-74, 47 USPQ2d at 1601-1602. Also see "Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility", OG Notices: 22 November 2005. It is clear that the claims merely involve calculations and manipulations of data in performing computations. The claimed invention does not transform an article or physical object to a different state or thing. The inputs are numbers and the outputs are also numbers. The result produced by the invention is a mere numerical value without a practical application recited in the claim that make the useful, concrete and tangible. Therefore, the claimed invention is directed to non-statutory subject matter as the claimed invention fails to accomplish a practical application (see MPEP 2106, I, C, 2, especially (2) (a)).

Applicant respectfully traverses the Examiner's remarks for a number of reasons as follows.

Claim 12 has been rewritten in independent form in such a manner that the claim as a whole now falls within the statutory class of a § 101 "process". Support for the limitations added to Claim 12 can be found throughout the originally filed application. For example, Claim 12's limitation "In a computer comprising a processor, a memory

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and a floating point unit" is supported by, for example, page 34 lines 12-14 ("Moreover, Intel's Pentium processor and the Intel486 processor both have one floating point unit") and page 25 at lines 32-33 ("the form of a toolbox or library installed in the memory of the user's computer").

Furthermore, Claim 12's limitation "a program written for a fixed point processor not available for execution of said program" is supported by, for example, page 31, lines 10-13 ("a program 110 may be written for use with a fixed point processor 130, such as, for example, a digital signal processor (DSP). Often, fixed point processor 130 is not available to the user.").

Also, Claim 12's limitation "said processor using said floating point unit in said computer to perform ... at least one floating-point operation" is supported by, for example, page 31 at line 25 and page 34 at lines 6-8 ("computer 120 use hardware (not shown) that is dedicated for performance of floating-point operations").

Moreover, Claim 12's last limitation "said computer displaying said fixed-point result to said user, to enable said program to be debugged without use of said fixed point processor" is supported by, for example, page 28, lines 13-17 ("FIG. 1C illustrates a graphical representation for a computation ... to obtain a result to be displayed (in box 135)"), page 32 at line 27 ("The result is displayed via act 135") and page 35 lines 32-35 ("thereby to allow programs written in fixed-point arithmetic to be developed and debugged without use of fixed-point hardware").

Finally, several limitations which are added to Claim 12 and not described above are supported in the originally-filed Claim 1.

In view of the above-described amendments, Applicant respectfully submits that Claim 12 is directed to a practical application. Specifically, Claim 12's method explicitly requires the storing a precision of a fixed-point operand and further requires use of the stored precision (to obtain the fixed-point result). Therefore, Claim 12 changes memory and uses memory. Moreover, Claim 12 does not produce "a mere numerical value without practical application." Instead, a program is debugged by use of a computer's display if it is transformed by Claim 12, from an initial state in which there was no fixed-point result displayed, into a different state that shows the fixed-point result.

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Hence, Claim 12's displaying of fixed-point result has real world utility, namely debugging of a program portion which includes an operation to be performed by a fixed-point processor, but without use of the fixed point processor. A programmer can simply use their computer to debug fixed-point programs as per Claim 12, without accessing a fixed point processor for which their program is being written.

As will be apparent to the skilled artisan, use of Claim 12 provides several real world advantages. For example, a fixed point processor may itself be under development and non-existent at the time a program is being written (and debugged) for the fixed point processor. Even if the fixed point processor exists, it may not be available for debugging purposes or may not support a debugging environment. By use of Claim 12, a program for a fixed point processor can be developed in parallel to development of the fixed point processor itself, which reduces the time to market of a new product. Other such advantages will be apparent, for the use of Claim 12's method which enables program debugging without use of a fixed point processor.

Therefore, Claim 12's display of a fixed-point result is protected under §101, in a manner similar to the display of a number in State Street Bank & Trust Co. v/s Signature Financial Group, Inc., 149 F.3d at 1373-74. In the State Street case a number was displayed, but the US Supreme Court looked to the real world significance. The US Supreme court stated "the transformation of data, representing discrete dollar amounts, by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces 'a useful, concrete and tangible result' – a final share price momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades."

Claim 12 is now explicitly limited to a practical application, which has §101 utility. Specifically, Claim 12 states that a portion of the program is written for a fixed point processor. A programmer can use Claim 12's display of a fixed-point result to debug the program portion without using the fixed point processor. Hence, programs which include fixed-point operations are made operational by use of the method of Claim 12. Therefore, Claim 12 provides a useful result.

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Moreover, Claim 12's method is computerized and hence it clearly excludes a formula that can be written down on a paper. Instead Claim 12 requires a display on a computer. Hence, Claim 12's method provides a tangible result.

Finally, Claim 12's method can be performed repeatedly, i.e. it is substantially repeatable and reproducible. Hence, Claim 12's method provides a concrete result.

In view of the above remarks, Claim 12's method provides a useful, concrete and tangible result. Hence, Claim 12 is directed to patentable subject matter under § 101.

Thus, reconsideration and withdrawal of the § 101 rejection of Claim 12 is respectfully requested. Claims 2-11 and 13-26 are amended to depend directly or indirectly from Claim 12 and are, therefore, likewise patentable.

As there are no other reasons stated in the above-identified Office Action, for the rejection of Claims 2-26, Applicant respectfully requests the Examiner to indicate allowability of these claims in the next office action.

Patentability of Claims 27-29

In the above-identified Office Action, Claims 27-29 were also rejected only under 35 U.S.C. §101 for being drawn to non-statutory subject matter. Claim 27 has been rewritten in independent form, in a manner similar to Claim 12 as discussed above, although the limitations in Claim 27 are different from Claim 12's limitations. Accordingly, the Examiner is respectfully requested to thoroughly review the limitations of Claim 27.

Claim 27 is believed to be directed to patentable subject matter under § 101 for reasons similar to those discussed above in reference to Claim 12. Thus, reconsideration and withdrawal of the § 101 rejection of Claim 27 is respectfully requested. Claims 28 and 29 depend from Claim 27 and are, therefore, likewise patentable.

As there are no other reasons for the rejection of Claims 27-29, Applicant respectfully requests the Examiner to indicate allowability of these claims in the next office action.

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Patentability of Claim 30

In the above-identified Office Action, Claim 30 was rejected under 35 U.S.C. §101 for being drawn to non-statutory subject matter. Claim 30 has been also rewritten in independent form, in a manner similar to Claim 12 as discussed above, although the limitations in Claim 30 are different from Claim 12's limitations. Accordingly, the Examiner is respectfully requested to thoroughly review the limitations of Claim 30.

Claim 30 is believed to be directed to patentable subject matter under § 101 for reasons similar to those discussed above in reference to Claim 12. Thus, reconsideration and withdrawal of the § 101 rejection of Claim 30 is respectfully requested.

Claim 30 was also rejected as being indefinite under 35 U.S.C. §112 for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. The Examiner explained that the limitation "overloading of an operator" is unclear.

This rejection is respectfully traversed because "overloading" is commonly understood in the art to indicate that an operator is given context-dependent meanings. For example, a programming language may use a given symbol (e.g. ".") to signify different built-in functions, and interpretation of the symbol depends on context.

The term "overloading" is best understood with examples. In a first example, appropriate overloading of the "+" operator can extend a built-in function of addition of two numbers, to an extended function of addition of two colors. In this example, an extended addition, of yellow and blue, yields a result of green. As a second example, overload of the same "+" operator can extend its functionality to perform an exclusive OR operation (i.e. a logical operation) on two binary operands. Accordingly what is done by a computer, to perform the "+" operation, depends on context.

In Claim 30, an operator that normally signifies an operation on floating-point operand(s) is extended in some embodiments of the invention to support the same operation on fixed-point operand(s). For example, Claim 30 covers use of the symbol "+" to signify addition of two fixed point operands, in computers that provide built-in support for use of this symbol to signify addition of two floating point operands.

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Overloading of an operator is described by Applicant throughout the original specification, for example:

Page 26, lines 11-15

For example, the symbol “+” is typically used in programming languages to denote addition. In object-oriented languages that support operator overloading, the “+” symbol is overloaded for fixed-point operands to indicate addition to the modified interpreter.

Page 27, lines 23-33

method includes using operator overloading and fixed-point objects in dynamically-typed languages as a mechanism for converting working floating-point programs into equivalent fixed-point programs. This method includes inserting a function call to identify a variable as being of fixed-point type, then using said variable in a statement (in a specification level computer program) without any other identifiers of the variable as being of fixed-point type.

Page 30, lines 29-34

Moreover, one or more fixed-point arithmetic operations are implemented by overloading an operator normally used to denote the corresponding floating-point arithmetic operation (e.g. the same symbol “+” denotes an arithmetic operation of adding two operands, regardless of the type of operands).

In view of the above remarks, Applicant respectfully submits that there is nothing unclear in the phrase “overloading of an operator.” Hence, Applicant respectfully requests the Examiner to withdraw the §112 rejection of Claim 30.

Claim 30 was also rejected under 35 U.S.C. §102(b) as being anticipated by US Patent 6,266,769 granted to Abdallah. The Examiner’s explanation for the rejection of Claim 30 is reproduced below (see bottom of page 3 and top of page 4 of the Office Action):

As per Claims 1, 4-6, 10, 13, 14, 20, 21, 30, 42-43 and 52, Abdallah et al disclose a method and apparatus that convert fix-point data to floating point data (col. 3, lines 62-64), performing floating point operations on the data (col. 3, line 64-66) and converting the result back to fix-point data (col. 3, line 46 – col. 4, lines 3).

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This rejection is respectfully traversed as being an "omnibus" rejection which does not provide an explicit one-to-one mapping of each limitation in Claim 30 to a corresponding disclosure in Abdallah's patent. Specifically, Claim 30 requires "overloading" which is nowhere disclosed or suggested by Abdallah.

In this context, note that "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Hence, to make a prima facie prior art rejection in future, the Examiner is respectfully requested to provide for each limitation in Claim 30 a corresponding pinpoint citation to Abdallah's patent.

In addition to the "overloading" limitation of Claim 30 which is not shown by Abdallah, Claim 30 is believed to further distinguish over Abdallah's patent for the several additional reasons such as the following.

Abdallah's patent fails to disclose or suggest that his "scalar integer data or memory data" is received as a portion of a program for whose execution a fixed-point processor is not available. Also, Abdallah's col. 3, line 46 – col. 4, lines 3 fail to disclose or suggest converting a floating point result into a fixed point result, contrary to the Examiner's statement.

Moreover, Claim 30 now requires displaying the fixed point result, i.e. the value from using the stored precision. In contrast, Abdallah teaches away, by disclosing that packed integer data are directly used (without any precision) to render an image display (see line 3 in column 4). Note that Abdallah does not display the number as required by Claim 30, and instead displays a color.

In view of the above-discussed reasons, Applicant respectfully requests the Examiner to withdraw the prior art rejection of Claim 30.

Patentability of Claims 40 and 41

In the above-identified Office Action, Claims 40 and 41 were rejected only under 35 U.S.C. §101 for being drawn to non-statutory subject matter.

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Claim 40 has been rewritten to require the computer to perform various physical acts. In particular, note that the computer is required to use a floating point unit. This limitation clearly precludes use of pencil and paper, and therefore does not cover all possible methods. Moreover, Claim 40 also now recites a limitation on displaying, which provides a real world utility. Hence, Claim 40 is believed to be is directed to patentable subject matter under § 101 for reasons similar to those discussed above in reference to Claim 12. Thus, reconsideration and withdrawal of the § 101 rejection of Claim 40 is respectfully requested. Claim 41 depends from Claim 40 and is, therefore, likewise patentable.

As there are no other reasons for the rejection of Claims 40 and 41, Applicant respectfully requests the Examiner to indicate allowability of these claims in the next office action.

Patentability of Claims 42 and 43

In the above-identified Office Action, Claims 42 and 43 were also rejected under 35 U.S.C. §101 for being drawn to non-statutory subject matter.

Claim 42 has been also been rewritten to require the computer to perform various acts in a manner similar to Claim 40 as noted above. Hence, Claim 42 is also believed to be is directed to patentable subject matter under § 101 for reasons similar to those discussed above in reference to Claim 12.

Thus, reconsideration and withdrawal of the § 101 rejection of Claim 42 is respectfully requested. Claim 43 depends from Claim 42 and is, therefore, likewise patentable.

Claim 42 was also rejected under 35 U.S.C. §102(b) as being anticipated by US Patent 6,266,769 granted to Abdallah. The Examiner's explanation for the rejection of Claim 42 was reproduced above on page 25 of the current amendment. The Examiner did not provide a specific explanation of the rejection of Claim 42. Accordingly, this prior art rejection is respectfully traversed as being an "omnibus rejection."

Also, Claim 42 is believed to be is directed to novel subject matter under § 102 for several reasons as follows.

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Claim 42 now requires a precision which identifies bits on the two sides of a point in a fixed-point number. Abdallah's patent fails to disclose or suggest that his format is expressed with a precision which identifies bits on the two sides of a point in a fixed-point number. In fact, on this issue, Abdallah teaches away from Claim 42's fixed point format by disclosing a "packed floating point format" and further disclosing a "packed integer format" into which the "the packed floating point graphics data are converted" (see column 3 line 67 to column 4 line 1).

Moreover, Claim 42 now requires displaying the fixed point result, i.e. the value from using the stored precision. In contrast, Abdallah teaches away, as noted above in reference to Claim 30, and instead displays a color.

Thus, reconsideration and withdrawal of the § 102 rejection of Claim 42 is respectfully requested. Claim 43 depends from Claim 42 and is, therefore, likewise patentable.

Patentability of Claims 44-51

Claim 44 was also rejected by the Examiner under § 101 for the same reasons as those discussed above for Claim 12. Once again the Examiner did not provide a specific explanation for the rejection of Claim 44 other than to state that this claim is "directed to a memory encoded with non-function descriptive material including merely fix-point values and their properties."

This § 101 rejection of Claim 44 is respectfully traversed because it does not take into consideration of the patentability of a data structure in memory. Specifically, a data structure which imparts functionality when employed as a computer component is patentable as per Annex IV of the Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility, 1300 Off. Gaz. Pat. Office 142 (Nov. 22, 2005). These Guidelines explicitly state that the definition of "data structure" is "a ... logical relationship among data elements, designed to support specific data manipulation functions." citing to the New IEEE Standard Dictionary of Electrical and Electronics Terms 308 (5th ed. 1993).

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Note that Claim 44 is not directed to a data structure per se, but instead it is directed to a memory which is patentable subject matter. In this context, the Examiner's attention is drawn to In re Lowry, 32 F.3d 1579, 1583-84, 32 USPQ2d 1031, 1035 (Fed. Cir. 1994) (claim to data structure stored on a computer readable medium that increases computer efficiency held statutory) and Warmerdam, 33 F.3d at 1360-61, 31 USPQ2d at 1759 (claim to computer having a specific data structure stored in memory held statutory product-by-process claim); compare with Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1760 (claim to a data structure per se held nonstatutory).

In view of the above remarks, Applicants respectfully submit that Claim 44 clearly recites a logical relationship among the data elements. Specifically, Claim 44's first location holds a value of a signedness property of a fixed-point number, Claim 44's second location holds a value of a complexness property of that fixed-point number, Claim 44's plurality of locations hold values of subproperties of a precision property of that same fixed-point number, and finally, Claim 44's at least one location holds a floating-point value of that very same fixed-point number. Accordingly, it is clear that locations of Claim 44's memory form a relationship among one another, in order to represent as a single object, a fixed-point number in memory. The just-described logical relationship links Claim 44's memory locations together, which enables the object to support specific data manipulation functions, namely fixed-point operations as described in Applicant's specification. Hence Claim 44 is believed to have utility and therefore patentable subject matter under § 101. Claims 45-51 depend from Claim 44 and are patentable for at least the same reasons.

Furthermore, Claim 48 is amended herewith to explicitly recite functional descriptive material in the storage medium. Support for the amendment to Claim 48 is found throughout the specification, including, for example, page 25 line 32. Accordingly, Claim 48 is believed to be patentable under § 101 for at least this reason (which is in addition to the above-discussed reason for Claim 44 from which Claim 48 depends).

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Patentability of Claim 52

Claim 52 has been amended to require storing in memory, displaying the result and also to require in the computer a memory and a floating point unit. Hence, in view of the above remarks, Claim 52 is believed to be patentable under § 101.

Additionally, Claim 52 requires means for displaying a fixed-point result and receiving instructions for debugging which is not disclosed by Abdallah. Hence Claim 52 is believed to be patentable under § 102 as well.

Hence, the rejection of Claim 52 should be withdrawn.

New Claim

Note that Claim 53 is added herewith. Several of the limitations of Claim 53 are based on corresponding limitations in originally-filed (and now canceled) Claim 1. For example, Claim 53's first limitation is supported by Claim 1's first limitation. Claim 53's second limitation of adding to the program a sequence of instructions to expand said fixed-point operand is supported by Claim 1's second limitation of expanding the fixed-point operand into a floating-point representation. Similarly, Claim 53's third limitation of adding to the program at least a first instruction to use a floating point unit to perform at least one floating-point operation is supported by Claim 1's fourth limitation on the computer using the floating point unit to perform at least one floating-point operation. Claim 53's fourth limitation of adding to the program at least a second instruction to reduce the floating-point result generated by the floating-point operation into a fixed-point result is supported by Claim 1's limitation of reducing the floating-point result generated by the floating-point operation into a fixed-point result. Finally Claim 53's last limitation on storing a transformed version of the program in memory is supported throughout the specification, including, for example, page 38 lines 3-12 and page 25 line 32.

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Conclusion

For the above reasons, Applicant respectfully requests allowance of all pending claims.

If the Examiner continues to reject any claim under 35 U.S.C. §101 in a future Office Action, the Examiner is respectfully requested to assist the Applicant as per the following remark in the Interim Guidelines (see page 16; emphasis added):

If the invention as set forth in the written description is statutory, but the claims define subject matter that is not, the deficiency can be corrected by an appropriate amendment of the claims. In such a case, USPTO personnel should reject the claims drawn to nonstatutory subject matter under 35 U.S.C. § 101, but **identify the features of the invention that would render the claimed subject matter statutory if recited in the claim.**

Accordingly, the Examiner is respectfully requested to assist in overcoming any §101 issue in any claim now pending this application.

Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 378-7777, extension 113.

CERTIFICATE OF FACSIMILE TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the U.S. Patent and Trademark Office to the fax number 571-273-8300 on June 29, 2007.

S. Omkar June 29, 2007
Attorney for Applicant(s) Date of Signature

Respectfully submitted,

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